



Missouri Department of Natural Resources Land Reclamation Program



2001 & 2002
Biennial Report

Introduction

The Missouri Department of Natural Resources' Land Reclamation Program plays an integral part in protecting and preserving Missouri's natural resources. The program is responsible for regulating today's mining industry and for

correcting health, safety and environmental problems associated with Missouri's legacy of abandoned mines.

When properly reclaimed, these areas can once again be used as farm lands or wildlife areas. Wildlife habitat remains a primary concern of the Land Reclamation Program. Whenever possible, abandoned mines are reclaimed with wetlands, native prairie grasses and trees that are part of Missouri's history. Reclaiming mine land also protects the environment by preventing toxic or acid mine drainage and soil erosion.

As a result of the decline of coal mining in Missouri due to the use of low sulfur coal from western states, the functions of the Land Reclamation Program are slowly evolving more toward the industrial mineral mining that is increasing within the state. These are primarily limestone, clay and sand and gravel mines all across our state. The Land Reclamation Program is committed to future changes that may be necessary to assure all mining and reclamation activities are conducted in an environmentally sound manner.

This biennial report provides information and statistical summaries concerning the activities and business of the Land Reclamation Program and its efforts to reclaim mined land during fiscal years 2001 and 2002.

For more information, contact the department's Land Reclamation Program at 1-800-361-4827 or (573) 751-4041.

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Front cover photo: *Stabilization and revegetation of flood damaged stream banks consisting of acid-forming minespoil and coal waste improved water quality at the Upper Cedar Creek project in Boone County.* Department File Photo

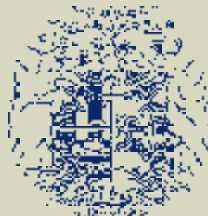
Land Reclamation Program and Administration

Organization

The Land Reclamation Program was originally established in the *Omnibus State Reorganization Act* of 1974. This act created the Department of Natural Resources and placed the Land Reclamation Commission (created by Missouri Statutes Chapter 444) under its auspices. The Land Reclamation Commission directs the staffing and operations of the program within the department's Air and Land Protection Division.

The seven-member commission includes three statutory members - the state geologist, the director of the Missouri Department of Conservation and the staff director of the Clean Water Commission. The governor, with Senate approval, selects four public members. Of these four, only two may be of the same political party. Only one member of the commission may have a direct link with the mining industry.

The Land Reclamation Program consists of the administrative unit that includes the director's office and two distinct sections, the mining section and the reclamation section. A total of 36 full-time staff members are divided between the sections and the Director's office. Together, staff members are responsible for regulatory oversight of all surface mining and reclamation of abandoned mine lands in Missouri. Through the years those responsibilities have increased as the statutory laws have increased. The challenges and accomplishments of the Land Reclamation Program staff are described in the following pages.



MISSOURI DEPARTMENT OF NATURAL RESOURCES

Larry P. Coen, Staff Director
Land Reclamation Commission

LAND RECLAMATION COMMISSION

PUBLIC MEMBERS

Ted A. Smith
Chairman

Jim DiPardo
Vice-Chairman

Hugh Jenkins
Member

Carol Wicks, Ph.D.
Member

STATUTORY MEMBERS

John D. Hoskins, Director
Department of Conservation

Mimi Garstang
State Geologist

Jim Hull, Staff Director
Clean Water Commission

Land Reclamation Mission

**To assure beneficial restoration of mined lands
and to protect public health, safety and the
environment from the adverse effects of mining
within the state of Missouri.**

Overview

Shortleaf pine seedlings from 30 year-old, planted trees grow vigorously on abandoned coal mine lands in central Missouri sustaining forest productivity and wildlife.

Mining activity in Missouri began as early as the 1740s. Early settlers used the state's reserves of lead, iron and industrial commodities such as limestone, sand and gravel. A new chapter unfolded in the 1840s with the arrival of coal mining in the state. From the date of the first mining until the enactment of Missouri's first strip mine legislation in 1971, nearly 67,000 acres were left unreclaimed by coal-mining operations, and an estimated 40,000 acres were left abandoned through the mining of other commodities. Missourians were left with acid mine drainage, dangerous highwalls, hazardous water bodies, dangerous mine openings, unvegetated and barren spoils, coal waste, soil erosion and stream sedimentation.

To offset the dangerous and unproductive after effects of mining, Missouri enacted legislation in 1971. *Senate Bill 1* also known as *Strip Mine Law*, effective March 28, 1972, regulated coal, tar sands and barite mining. *House Bill 519*, effective Jan. 1, 1972, regulated limestone, sand, gravel and clay pits. The Land Reclamation Commission was formed to enforce these laws, and the Land Reclamation Program was created to administer them, acting as the commission's staff. Subsequently, the program became part of the Missouri Department of Natural Resources' Air and Land Protection Division.

Through growing national concern over the environmental degradation caused by coal mining, Public Law 95-87 was passed in 1977 by the U.S. Congress. This law, also known as the *Surface Mining Control and Reclamation Act* or SMCRA, dictated specific requirements for the reclamation of coal mined land, and also established state regulatory authorities for the enforcement and monitoring of surface mine reclamation activities. The act also established programs and funding for reclaiming coal mine lands mined prior to May 2, 1977. On May 3, 1978, the Legislature amended Missouri's *Strip Mine Law* establishing Chapter 444.535 RSMo, commonly referred to as the *Interim Program Law*. Requirements of this law include the following:

- A. Topsoil must be removed and replaced to a minimum six-inch depth;
- B. All prime farmland soils must be removed and replaced to 40-inch depth;
- C. All mined land must be reclaimed to an equal or better land-use capability;
- D. Mined land must be backfilled and graded to approximate original contour;
- E. Coal waste and other acid-or toxic-forming material must be covered with a minimum of four feet of non-toxic material; and





This new creek channel at Continental Coal, Inc. has been reconstructed in a mined spoil area.

- F. A permanent vegetative cover compatible with the premining land use must be established.

On May 17, 1982, the Missouri Legislature passed the *Surface Coal Mining Law* (Chapters 444.800 - 444.970) to match federal standards established in SMCRA. The law made changes to the permitting process and granted the Land Reclamation Commission the authority to administer the abandoned mine land program. Coal companies were now required to submit baseline information on the hydrology, geology, soils, fish and wildlife, and cultural resources of the proposed mining area along with a detailed description of the proposed operation and reclamation plan. The most significant change to the reclamation requirements was that prime farmland soils must be removed and replaced to a 48-inch depth. These requirements, known as the *Permanent Program Law*, continue in effect to the present day.

Missouri's *Surface Coal Mining Law* (Chapters 444.800 - 444.970) was also amended in 1993 to address deficiencies in Missouri's bonding provisions to conform with federal requirements.

The *Land Reclamation Act* and the regulations governing tar sands and barite mining remained essentially unchanged during the evolution of the coal mining standards. In 1990 the passage of *House Bill 1584* amended the *Land Reclamation Act* to encompass all non-coal surface mining activity. This includes limestone, sand, gravel, clay, tar sands and barite mining. Sandstone, granite and traprock quarries also became subject to mining regulations. The revisions require a much more thorough description of the method of operation and reclamation. The public was also included in the permitting process for the first time, via a public notice and comment procedure. In addition, the right of anyone affected by a non-compliance at an operation could request a hearing before the Land Reclamation Commission. Time frames requiring operators to complete reclamation in a timely manner were established. Bonding fees were significantly increased to ensure the state could complete reclamation in the event a permit is revoked. Grading to a traversable topography, as well as replacing 12 inches of topsoil were also required. Following these amendments, rules and regulations were developed that underwent the formal rulemaking process and became effective Feb. 6, 1992.

Highlights for 2001 and 2002

The department's Land Reclamation Program continues to make steady progress in addressing Missouri's Abandoned Mine Land problems. During this two year period, 116 acres of Abandoned Mine Land containing health and safety problems and 21 dangerous mine openings were reclaimed. Six reclamation projects are featured in this year's report. These include the Greasy mine Shaft Reclamation Project, the Old Bevier Wetland Remediation Project, the Upper Cedar Creek Clean Streams/319 Project, the Ellis Coal project, Perry Mine Fire Emergency project and the Joplin Shafts Lead/Zinc Shaft Closure project. These projects exemplify the work that is conducted through Missouri's Abandoned Mine Land program.

1 For the two-year period reclamation was completed on 515 acres of land used for industrial mineral mining. Reclaimed land uses include agriculture, wildlife habitat, commercial development or water related uses such as fishing or boating.

2 The Upper Cedar Creek Clean Streams/319 Project was completed by the Abandoned Mine Land Unit. It was funded by an Environmental Protection Agency 319 grant and Clean Streams Initiative money from the Office of Surface Mining. Water quality has greatly improved at the site since the completion of the project, which included the construction of six wetlands to treat acid mine drainage.

3 The Land Reclamation Program began closures of extremely dangerous, high priority abandoned non-coal shafts in the state of Missouri using Abandoned Mine Land funds after receiving a request from the Governor and authorization from the Office of Surface Mining and State Attorney General's

Office. Seventeen shafts were closed within two projects in Jasper County, and one hematite shaft was closed in St. Francois County. One more project is under design to close 9 additional shafts in Jasper County.

4 Changes in the 2001 edition of The Land Reclamation Act allows for provisions to increase the current fees involved in obtaining a permit. The newly proposed fee rate increase requires changes in the Code of State Regulations and those changes are expected to be implemented by the close of the year 2002. The proposed fee increase includes a \$300.00 permit fee for operators mining less than 5,000 tons of sand or gravel whereas the current fee is \$100.00. There will also be a \$5.00 an acre fee for every acre that is under bond with the departments Land Reclamation Program. In any case a total permit fee will not exceed \$2,500.00.

5 In late 2001, four public meetings were held to receive feedback from new proposed sand and gravel mining rules. A public hearing was held in January 2002, and a workgroup consisting of industry, landowners, public interest groups, and state and federal agencies was formed to discuss and come to a consensus on the rules.

6 During the two year period 1295 acres of reclaimed coal lands were granted Phase III release by the Land Reclamation Commission. As coal mining in the state decreases mining companies have accelerated reclamation to limit their reclamation liabilities. The Land Reclamation Program conducts thorough reviews of these reclaimed lands to insure compliance with performance standards.

Coal Mining Activities

Over recent years, Missouri coal production has declined from 4.2 million tons in 1987 to approximately 0.4 million tons during 2002 (Table 1). This decline is largely due to industry demands for low-sulfur, western coal needed by power plants to reduce air pollution and meet emission standards required by the federal Clean Air Act. Other factors associated with declining coal production in the state are reclamation and transportation costs. Most of Missouri's coal reserves contain relatively high sulfur content, ranging from 2-7 percent by weight. However, Missouri coal has a relatively high British Thermal Unit (BTU) compared to western coal. In recent years, some power plants have opted to mix Missouri's coal with lower BTU western coal in order to increase energy production without exceeding sulfur emissions.

Over the last two fiscal years, most of the coal removal efforts have been concentrated in a small area in southwestern Missouri where coal seams contain lower levels of sulfur. During this time period, the Land Reclamation Program issued one new coal mining permit, which covered 575 acres of land and expanded another mine by 121 acres; both sites are located in Bates County. At the end of the 2002 fiscal year, two of six companies holding one or more Missouri surface coal mine permits were still producing coal. At that time the remainder of the mines were in various stages of reclaiming the land to regulatory standards.

Land Reclamation Program staff closely monitors coal mining operations, including both coal removal and reclamation activities. Declining coal production in no way decreases the responsibilities of the Land Reclamation Program. Monthly inspections of each mine continue to be performed long after the last ton of coal is removed. Revisions to permits and reclamation changes continue to be submitted for review and approval, as operators fine-tune

their post-mining land use plans. Bond release requests increase in number and in size as more ground is reclaimed to acceptable standards. In effect, reclamation activities consume a far larger percentage of time and effort than the actual mining of coal itself.

Coal Permitting

Staff members are responsible for reviewing permit revisions and new permit applications. A summary of the permit actions for fiscal year 2001 and fiscal year 2002 are provided in Table 2 on the next page. Land Reclamation Program staff are professionally trained in specific technical areas and are responsible for reviewing technical plans with respect to their area(s) of expertise. Technical areas that must be reviewed include engineering, blasting, soil science, geology, hydrology, revegetation, land use plans, fish and wildlife protection, cultural and historical resources and reclamation technology. Staff members review all coal permit applications for adequacy and recommend approval or denial to the Land Reclamation Program Staff Director. Staff conducts regular evaluation of existing permits and also provides technical assistance to the mining industry and the public.

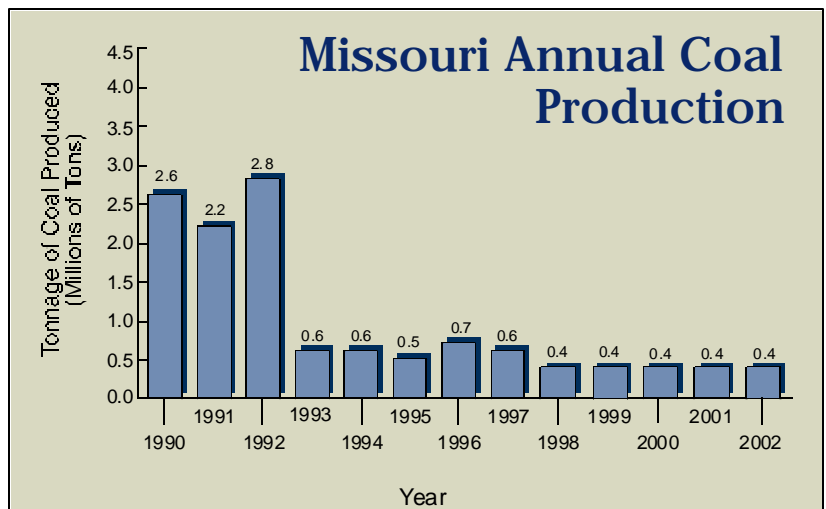


Table 1

A thorough review of surface coal mining permit applications, permit revisions, and other permit-related actions is necessary to ensure that all requirements of the law and regulations are met. This includes determining that all applications, as well as the review process itself, meet all legal and administrative requirements. The permitting requirements for coal mining are extensive, requiring careful evaluation of diverse and comprehensive environmental topics such as soil characteristics, surface and subsurface water quality controls, fish and wildlife information, cultural resources and land use planning. Reviews also focus on specific details such as engineering designs for sedimentation ponds and water diversions, blasting plans and hydrogeologic data to determine the probable hydrologic consequences of mining. Other permitting responsibilities include evaluating each applicant's legal compliance history with past mining activities and ensuring that all public review requirements are fulfilled. Staff members

also coordinate with other regulatory agencies to ensure that the company proposing to conduct the mining activity has obtained other necessary environmental permits.

Reclamation begins immediately after coal is removed from a strip mine pit. Regulations dictate that a pit must be completely backfilled and graded no later than 180 days after coal removal. Topsoil must then be redistributed within an additional 270 days. The area must then be seeded during the first available growing season, with specific vegetation sufficiently established to control erosion by the end of the second year. Sediment ponds, diversions, explosive storage areas and maintenance pads also are subject to reclamation requirements once they become inactive or are no longer needed as part of the mining operation. Only when these requirements are met can an operator obtain a release of reclamation liabilities.

All coal operators are required to post reclamation bonds. Bonding rates presently are \$2,500 per acre for mined land and \$10,000 per acre for any area used to store or process coal. An operator can submit a written request for release of bond liability if all reclamation requirements for a given area have been met. The area is evaluated by an inspector who then reports his conclusions to the Land Reclamation Commission. The commission will then either approve or deny the request.

Bond release is a complex process. Three stages of criteria, termed Phase I, Phase II and Phase III must be met before an operator gains complete release of liability. An area qualifies as Phase I release upon completion of backfilling and grading, topsoiling, drainage control and initial seeding. Phase II release can be granted as soon as a permanent vegetative cover sufficient to control erosion is in place, soil productivity on Prime Farmland is restored, trees are established where required, and the lands are not contributing sediment to streams or runoff outside the permit area. Phase III release is gained once all terms and conditions of the approved reclamation plan and applicable laws are met, soil productivity has been restored to pre mining capabilities, established vegetation is compatible with the proposed post-mine land use, all vegetative standards for success are met, and a five year

Surface Coal Mining Permit Actions for		
Fiscal Year 2001 and 2002	State Fiscal Year 2001	State Fiscal Year 2002
New surface mining permit applications received.	0	1
New surface mining permit applications approved.	1	0
New exploration permit applications received.	1	0
New exploration permit applications approved.	0	1
Permit amendments received (permit revisions, permit renewals, permit transfers).	117	113
Permit amendments finalized (approved, withdrawn, denied).	103	87

Table 2

liability period has been completed in which no further soil amendments were required. This process, in the most favorable of circumstances, takes a minimum of seven years to complete.

Reclamation rarely proceeds unhindered. Oversights, improper land management and unforeseen problems all contribute to delays in obtaining bond release. From 1982 to 1995, the number of mined and reclaimed ground that Land Reclamation Program has regulatory responsibility for increased. Since 1995, mining has decreased and companies have completed reclamation, thereby gradually decreasing the mined disturbed acres under the responsibility of Land Reclamation Program. Since the inception of the Permanent Program rules and requirements in 1982 through fiscal year 2002, over 10,000 acres have been permitted for coal mining activities. Of this total, 19,928 acres of that land was actually disturbed by mining activities. Phase I release has been granted on 15,292 of these acres, or 77 percent of the disturbed land. Phase II release has been granted on only 11,848 acres, or 59 percent of all disturbed acreage. Phase III release amounts to 8,886 acres, or 44 percent of all disturbed land mined since 1982.

Combined with many other duties, Land Reclamation Program personnel anticipate that monitoring reclamation progress and evaluating bond release requests will present a challenging work environment for many years to come. As coal production declines, companies will become increasingly compelled to concentrate their efforts toward obtaining bond releases. This trend has been occurring over the past six years (Table 3). Even if all mining ended today, at the present rate of bond release it would take another two to five years for all Phase I to be released, an additional two to five years for all Phase II to be released, and an additional four to seven years for all Phase III to be released.

Coal Mining Inspection

Reclamation activities are as closely monitored as coal removal activities to ensure that that required performance standards are met

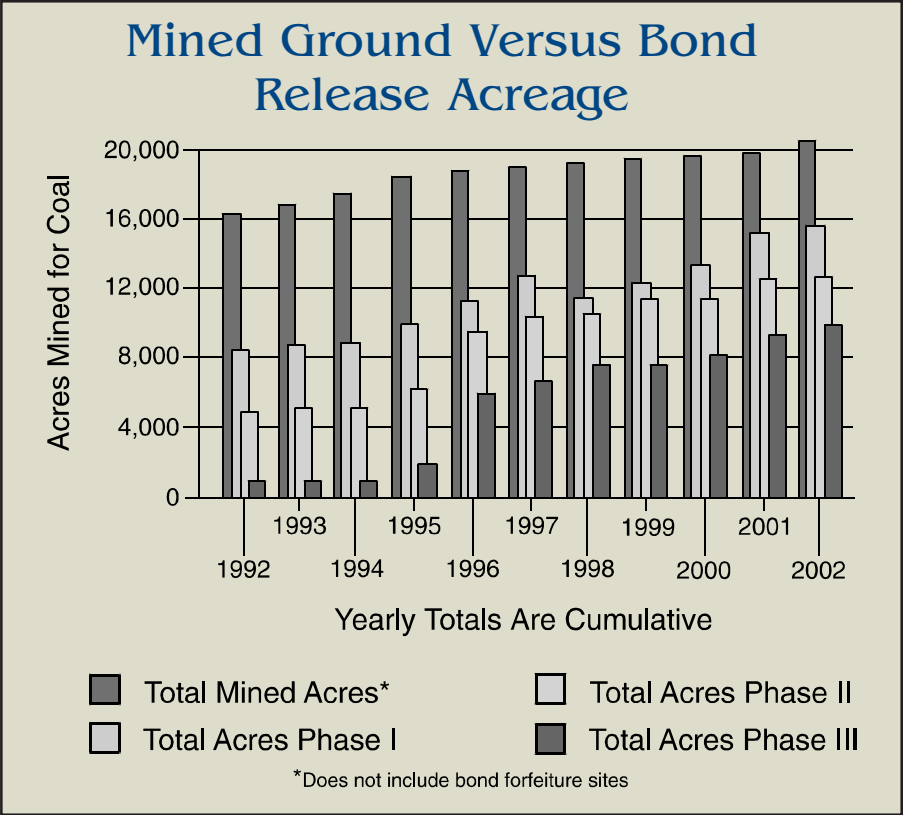


Table 3

and the reclamation plans approved in the companies' mining permits are followed.

Coal mine inspections are performed monthly. On-site inspections serve three primary functions:

1. Ensure an operation is functioning in a manner consistent with applicable state laws;
2. Ensure an operation is fully complying with the conditions of the permit; and
3. Provide a public record on the status of mining and reclamation at a site.

Two styles of inspections are done, termed a complete and partial. Complete inspections are required once per calendar quarter. They involve complete review of an operator's compliance with all permit conditions and state statutes. As the name implies, partial inspections are a review of an operator's compliance with some of the permit conditions and state statutes. Aerial inspections can be substituted for partial inspections.

The many aspects of a mining operation are scrutinized during an inspection to ensure the following:

1. Mining occurs within the confines of the permit;
2. Topsoil is being salvaged and stockpiled;
3. All runoff from mined areas enters sedimentation ponds;
4. Pits and other areas of mine disturbance are promptly backfilled and graded;
5. Topsoil is replaced; and

6. Vegetation is quickly reestablished to control erosion.

Monthly inspections continue long after an operation ceases mining coal. Continued monitoring ensures that reclamation continues in an expedient manner and that all conditions of the reclamation plan are followed. Only when an operator gains approval for a Phase II release (vegetation sufficient to control erosion) does the inspection frequency decrease from monthly to quarterly. This level of release commonly is not reached until several years after mining ceases.

2001 – 2002 Inspection and Enforcement Activity

Coal

Show-Cause Orders	2
2001	2
2002	0
Notice of Violations	83
Operational	21
Reclamation	22
Maintenance	17
Administrative	23
Cessation Orders	33
Imminent Danger	0
Failure to Abate Notice of Violation	33
Number of Inspections	644
2001	336
2002	308
Number of Acres Releases from Bond for Coal	
Phase I	2086.35
Phase II	278.75
Phase III	1295.25

Industrial Minerals

Notices of Violation	49
Aministrivtive	19
Operational	30
Number of Inspections	353
2001	217
2002	136
Acres Released from Bond	543
2001	296
2002	247

Coal Mining Enforcement

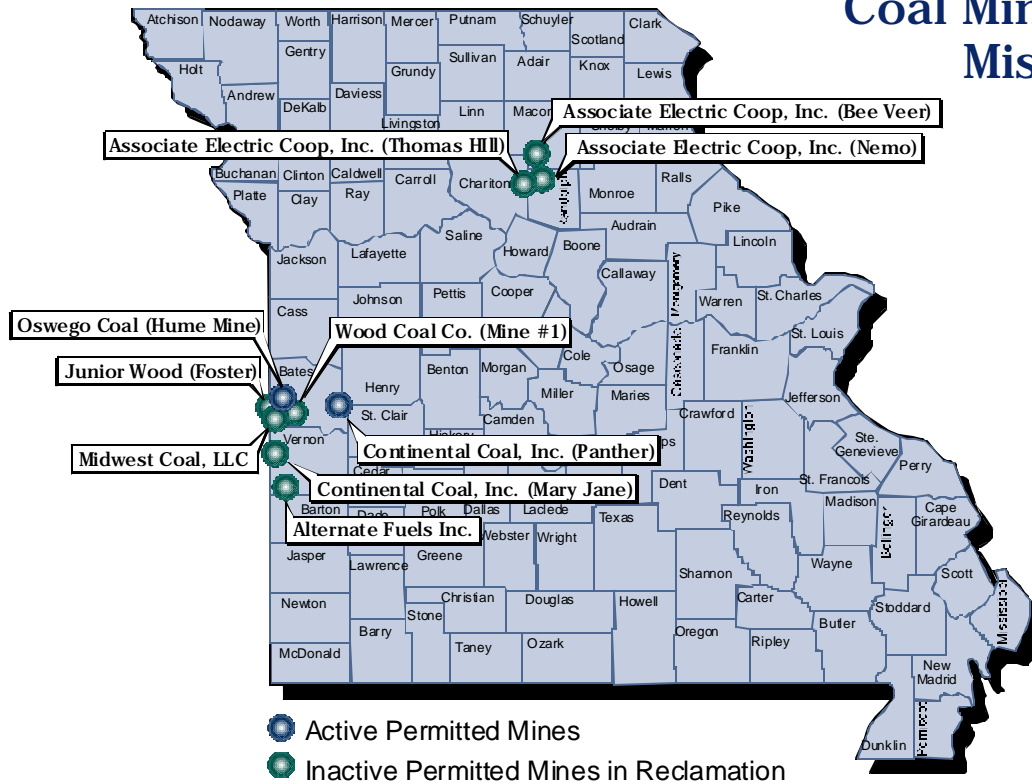
One of the results of doing inspections is issuing enforcement actions. Notices of Violation are frequently issued when an operator is out of compliance with the conditions of the permit or with state statutes. They include both minor and major infractions of the law, and give the operator time to correct the violations. Cessation orders are more serious. They are issued when a condition or practice at the mine site constitutes imminent danger to the health and safety of the public or imminent environmental harm to land, water or air resources. It may require the immediate cessation of mining until the problem is corrected. Cessation orders, because of their seriousness, require immediate abatement by the operator. Failure to do so may lead to revocation of the permit. Cessation orders also are issued for failure to abate a notice of violation within the required time frames.

If Cessation Orders and not abated in a timely manner, the next enforcement action is a Show-Cause Order. This means the operator is ordered to show why their permit should not be revoked and the reclamation bond forfeited. Show-Cause Orders may also be issued for other reasons such as for patterns of violations and uncorrected delinquent reclamation.

Table 4 displays enforcement actions issued during fiscal year 2001 and fiscal year 2002. The 21 violations issued for failure to follow the approved method of operation include mine-related activities such as topsoil removal, blasting, sediment control, pond construction and observance of buffer zones. Failure to follow the

Table 4

Coal Mines in Missouri



approved method of reclamation includes violations issued for exceeding specified time frames for backfilling and grading pits, covering acid-forming spoil and top soiling and reseeding. Failure to maintain constructed features relates to the deterioration of mine support facilities such as sedimentation ponds, diversions, haul roads and stockpiles. Administrative violations include failure to submit permit renewals, certificates of insurance, reclamation fees, water monitoring records and blasting notices within the required time frames.

Coal Bond Forfeiture

Each permitted coal company in the State of Missouri is required to provide financial assurances to ensure reclamation of the site after coal removal. Upon completion of reclamation to applicable regulation standards, the coal company receives a release from the Land Reclamation Commission related to reclamation liability and the financial assurances or bonds are released. Should a coal company fail to provide reclamation to applicable regulation standards the bonds are forfeited to the Land Reclamation Program and these bonds are used to provide

reclamation to the site mined by the coal company.

The Coal Mined Land Reclamation Fund is another source of funding dedicated to the reclamation of sites, which were not adequately reclaimed by the coal company. The monies for this fund are attained through a surcharge placed on each ton of coal mined by active coal mining companies in Missouri.

The Land Reclamation Program completes the design work on the forfeited sites. The proposed work is then publicly advertised and bid out through the Office of Administration. Inspection of the construction contract is either conducted by Land Reclamation Program staff or by a private firm. This reclamation removes acidic impoundments, dangerous highwalls, coal refuse material and barren lands to be replaced with small lakes and ponds, vegetated pastures and prime farmland areas. The results will provide wildlife habitats, farming and grazing habitats and recreational settings that will be beneficial and enjoyable to landowners for many years.



Top photo: Seismic monitors such as these are set up to assure that blasting from coal mines do not exceed vibration and air shock limits that are established by regulation. Bottom photo: Strict controls are placed on the use of explosives at coal mines to ensure that off site impacts are minimal.

Summary of Bond Forfeitures

Between 1981 and 1987 there were eight separate coal mining companies that ceased business operations and failed to provide reclamation to applicable regulation standards. These companies forfeited bonds on approximately 4,000 acres of land under permit. In 1998 initial reclamation was completed at Bill's Coal in Vernon County, Missouri, and due to a funding deficiency, some Abandoned Mine Land funds were used in the reclamation of the Bill's Coal site. This was the final completed project related to companies who forfeited bond between 1981 and 1987. The Land Reclamation Program is still maintaining four sites until they can be presented to the Land Reclamation Commission for a liability release. These are expected to be presented for a liability release in 2003.

Between 1990 and 1999 an additional eight separate coal mining companies ceased business operations and failed to provide reclamation to applicable regulation standards. These companies forfeited bonds on approximately 4,300 acres of land under permit. Initial reclamation has been completed for the Amearth Project located in Vernon County. During 2002 reclamation was completed on parts of 300 acres of Universal Coal & Energy Howard and Randolph counties known as the Pit 7 Project. Many of the acres did not require extensive reclamation work but required the repair of pond structures, elimination of erosion and establishment of vegetation. Design work is now being completed for the Pit 4 area which encompasses 470 acres of the Universal Coal & Energy forfeiture. Of the seven projects forfeited between 1990 and 1996, two projects have received a complete liability release due to completion of reclamation activities. Due to the size of the permitted area related to Missouri Mining Inc. (over 1,800 acres), reclamation of these lands will take several construction contracts over several years.

On Nov. 19, 1999 the New York Frontier Insurance Company entered into an agreement with the Land Reclamation Commission to reclaim three surface coal mine sites that were left abandoned by North American Resources, Inc. and Riedel Energy, Inc., Fred A. Lafser, President. The permit holder abandoned the Silver Creek Mine in Randolph County (392-acre permit), the Foster Mine in Bates County (274-acre permit) and the Perry Mine in Ralls and Monroe counties (1,912 acres on seven permits). A reclamation plan for the Silver Creek Mine, located near Yates, was submitted by Frontier Insurance and the approved reclamation plan was initiated in the spring of 2000. However, Frontier experienced financial problems. Its business dealings were taken over by the New York State Department of Insurance, who has agreed in principal, to cooperate in the reclamation of the three sites. To date, the Silver Creek Mine has been near total reclamation and reclamation was begun in September 2002 on the Foster Mine. Reclamation plans are still under development for the Perry Mine.

Industrial Mineral Mining Activities

Industrial Mineral Permitting

Amendments made in 1990 to *The Land Reclamation Act*, Missouri's industrial minerals mining law, increased the requirements for completing industrial mineral permit and reclamation processes. However, the complexity of permitting and reclamation requirements for industrial minerals still remain far below those required under the current coal mining law. Industrial Mineral Permit application forms and directions are now available electronically at our Web site at www.dnr.mo.gov/alpd/lrp.

Changes in the 2001 edition of *The Land Reclamation Act* allows for provisions to increase the current fees involved in obtaining a permit and provides the public more opportunities to comment on a submitted application. The newly proposed fee rate increase requires changes in the Code of State Regulations and those changes are expected to be implemented by the close of the year 2002. The proposed fee increase includes a \$300 permit fee for operators mining less than 5,000 tons of sand or gravel whereas the current fee is \$100. There will also be a \$5 an acre fee for every acre that is under bond with the departments Land Reclamation Program. In any case a total permit fee will not exceed \$2,500.

An operator is now required to send a notice of intent to operate a surface mine, by certified mail to all adjacent landowners and too the governing body of the counties or cities in which the proposed mine area is located. The operator is also required to publish a public notice involving the intent to operate a surface mine once a week for four consecutive weeks in a newspaper that fulfills the requirements of 490.050 RSMo. and is located in the county where the proposed mine is located. The public notice requirements also allow the public an opportunity to request a

Industrial Mineral Sites Permitted

2001 Commodity	Number of Sites
Limestone	19,375
Sand and Gravel *	430
Clay	1,406
Barite.....	78
Granite	206
Sandstone	6
Rhyolite	34
Shale	35
Total	952

2002** Commodity	Number of Sites
Limestone	289
Sand and Gravel *	316
Clay	84
Barite.....	1
Granite	5
Sandstone	3
Shale	1
Total	699

* Does not include the instream sites that are permitted by the Corp of Engineers.

** Figures for 2002 are calculated on Dec. 17, 2002 and do not represent the entire 2002 total.

public meeting concerning a submitted application that was previously not mentioned in the *Act*. Operators also have the right to respectfully decline a public meeting if they desire. The public comment period now lasts for forty-five days. Prior to the 2001 edition of *The Land Reclamation Act* there was no opportunity for the public to request a public meeting and the public

Table 5



An industrial minerals limestone rock quarry, Colonial Limestone prior to reclamation. See after photo on page 15.

comment period lasted for only a fifteen day time period, following the one-time running of a public notice advertisement in the newspaper. Operators are also holding their own version of a public meeting or “open house” neighborhood gatherings to discuss the plans to mine in new areas with great success.

Since Aug. 28, 2001 there has been five public meetings held based on the 2001 edition of *The Land Reclamation Act*. Attendance figures at the public meeting ranged from a group of nine members to a crowd of nearly 80 people. Four of the public meetings did resolve the concerns expressed by the public and did not go as a presentation requesting a hearing before the Land Reclamation Commission. Public meetings provide a forum for the public to better understand or resolve issues related to a proposed quarry. Public meetings provide a starting point for a company to reveal the proposed mine plan and provide responses to the public's concerns. Some of the topics covered at the public meetings involve impacts to air quality, water quality, permitting issues, blasting related issues, concerns beyond the scope of *The Land Reclamation Act* and livelihood issues. Without the public's input at meetings like these, the department would not be aware of the potential impacts a proposed surface mine may present.

Following a public meeting, *The Land Reclamation Act* at Section 444.773.3, RSMo, requires the Staff Director to make a formal recommendation regarding the issuance or denial of an applicant's permit. The director's recommendation is based on several specific items as follows: 1. The application's compliance with section 444.772, RSMo; 2. The application's compliance with 10 CSR 40-10.020; 3. Consideration of any written comments received; 4. Whether the operator has had a permit revoked or a bond forfeited; and 5. If a petition is filed and a hearing is held, the commission shall make the decision.

The industrial minerals permitting program continues to look for ways to improve its methods of helping the public to understand the industrial minerals permitting procedures. Each year, citizens living near proposed mines request six to ten public hearings on the issuance of permits. Because of the precise criteria established in *The Land Reclamation Act*, the Land Reclamation Commission has been prohibited from granting any hearings, until the first request for a hearing was approved in May 1998. The most recent granting of a hearing request by the Land Reclamation Commission involved a permit application proposing a 1,627-acre limestone mining operation in Ste. Genevieve County. The hearing request was granted at the May 30, 2002, commission meeting. Currently, involved parties are searching for an officer to hear the case.

Requests for hearings require a tremendous amount of staff time to address and will become increasingly common as mining companies look to open sites near heavily populated areas. New sites and expansions to existing sites are needed in order to provide building commodities to meet the needs and demands of on-going and new construction. It is likely that sometime in the future, changes may need to be implemented to associated statutes, rules or internal policies in order for the Land Reclamation Program to better respond to the needs of the environment, the unregulated community and the mining companies of industrial mineral-related issues.

Routinely, the concerns brought to the commission involve issues outside the regulatory authority provided to the Land Reclamation Program through *The Land Reclamation Act*. These issues include concerns about blasting,

safety on public roads and the mine's effect on property values. Even so, the commission has encouraged all citizens who have requested hearings under the proper circumstances to personally appear at regularly scheduled public meetings to express their concerns. While the constraints in the laws have prohibited the commission from denying permits, this regular contact with the public has brought an acute awareness to the commission about what is most troubling to the citizens. In return, the public has an opportunity to learn more about the reclamation requirements under *The Land Reclamation Act*. Continued contact of this sort will certainly help pave the way for the citizens to resolve their concerns about mining.

Industrial mineral mining permits are issued for a one-year period. The industrial mineral permits must be continually renewed until the Land Reclamation Commission or staff director deems all mined land covered by the permit fully reclaimed. Approximately 600 new or renewed permits were issued in the past two years. Since some permits contain multiple sites, the number of permitted sites is substantially higher as noted in **Table 5**. In addition to the new and renewed permits, staff spent a considerable amount of time reviewing other permit actions, which include permit transfers, expansions and amendments. Information regarding the number and types of industrial mineral mining sites covered by Land Reclamation Program permits during the past two years is presented in **Figure 3**.

Fees collected from industrial mineral permits are used to conduct necessary regulatory functions. As of May 1998, these functions include managing the permitting, inspection and enforcement of industrial mineral mines. Finding a way to complete reviews on over 300 permit actions each year while conducting necessary inspections proves challenging for the Land Reclamation Program.

Industrial Minerals Inspection

The state is divided into seven geographic regions with one inspector assigned to each area. Each of the seven geographic regions is equal to about 13 counties. Inspectors also conduct other duties not related to on-site

inspections such as permitting of industrial minerals operations and inspections of coal mines. Inspectors are limited to the amount of on-site inspections they can perform in a given year. The operations range in size from large 300+ acre limestone quarries to small half-acre gravel bars. In 2001, there were 952 permitted industrial mineral sites.

During 2001, 217 inspections were conducted on industrial mineral sites and in 2002, and as of mid-December, 136 inspections were conducted. There still remains some time to conduct inspections in the remaining year. The total of 353 inspections conducted during 2001 and 2002 represents a 50 percent reduction in the number of inspections conducted during 1999 and 2000. This reduction in the number of inspections is related to: increased inspections at coal mines and increased manpower needed in permit reviews for industrial minerals.

Inspections typically fit into one of three categories: regular inspection, complaint inspection or bond release inspection. Regular inspections are conducted to determine if an operator is in compliance with the approved permit and the applicable performance requirements of *The Land Reclamation Act*. Performance requirements checked by inspectors include timeliness of reclamation, safety barriers, lateral support, erosion and siltation control, grading, topsoil handling and revegetation. Inspectors also evaluate each mine site to ensure that all mining disturbance is confined to the permitted and bonded area and that the approved post-mining land uses are being established. Complaint inspections are conducted after the Program receives notification from the public that an industrial minerals operation may be in violation of *The Land Reclamation Act*. Complaints filed by citizens may involve blasting, noise, truck traffic, water pollution, erosion or siltation. Following an investigation, the inspector and operator are often successful in resolving a citizen's complaint in a timely manner. However, many public complaints related to mining operations, such as blasting and noise, are not regulated by the Land Reclamation Program and are referred to the appropriate regulatory authority.

Bond release inspections are conducted at the operator's request when reclamation has

An industrial minerals limestone rock quarry, Colonial Limestone, after reclamation. See before photo on page 13.



been completed. The focus of the bond release inspection is to determine if the mine site has been reclaimed in accordance with the reclamation plan. The inspector also must evaluate if the operator has established the designated post-mining land use(s). Post mining land uses may be designated as wildlife habitat, agricultural, development or water impoundment. A change in the 2001 edition of *The Land Reclamation Act* also allows the staff director to determine that the bond, or any portion thereof, should be released. When mined land is properly reclaimed a recommendation for bond release is made to the Land Reclamation Commission or the staff director. If either the Land Reclamation Commission or staff director approves the request for approval of reclaimed land, the reclamation performance bond is released back to the operator. The Commission and staff director approved the release of 296 acres of reclaimed mine land in 2001 and 247 acres in 2002.

Industrial Minerals Enforcement

The enforcement powers of the Land Reclamation Commission were enhanced in two significant ways by revisions made in 1990 to The Land Reclamation Act. The commission may impose administrative penalties when notices of violation are issued, and they have the option of referring civil actions to the Cole County Court rather than the county in which the violation occurred. These revisions have resulted in more prompt and vigorous action by the operators to eliminate violations.

Often violations observed during an inspection are eliminated through the use of conference, conciliation and persuasion. This process encourages the operator to correct a noncompliance through voluntary action and is used normally in cases of relatively minor noncompliance. If attempts to correct a violation through conference, conciliation and persuasion are not successful, a notice of violation is issued to the operator.

Table 2 displays the notices of violation issued to industrial mineral operators during 2001 and 2002. Similar to the previous two year total, 46 notices of violation were issued during 2001 and 2002. However, approximately 50 percent fewer inspections were conducted during 2001 and 2002 compared to 1999 and 2000. Of the 46 notices issued during 2001 and 2002, 17 were administrative in nature and 29 were operational violations of the performance requirements. Administrative violations often involve mining without a valid permit or mining outside of the permitted area. Notices of violations related to performance requirements (operational violations) include the failure to control off-site sedimentation, erosion, improper topsoil handling, and the failure to meet safety barrier requirements.

A reduction in the number of site inspections at industrial minerals operations typically carries the potential for a decrease in enforcement activity during a specific time frame. Although there were 50 percent fewer inspections compared to the previous two-year time period the amount of issued violations remained similar. Industrial mineral operators who are not familiar with the requirements of The Land Reclamation Act risk inadvertent noncompliance. Only through close coordination with the department's Land Reclamation Program personnel are potential enforcement actions avoided or minimized.

In-Stream Sand and Gravel Mining

One of the most prevalent types of mining in Missouri, as far as the number of sites, is the in-stream extraction of sand or gravel. There are 430 permitted in-stream sites; the next closest commodity as compared to the total number of sites is limestone, at 373 sites. Although the total number of sites involving in-stream extraction is greater compared to limestone, the total number of acres involved at limestone operations is approximately 85 percent greater compared to the total number of acres involved with in-stream operations. Numerous operators across the entire state use sand and gravel deposits, called gravel or sand bars, as a source of aggregate material.

During the 1990s this activity underwent several changes in regulatory control within Missouri. In the early 1990s, the department's

Land Reclamation Program was the permitting and enforcement authority that both issued permits for this type of mining activity and also oversaw the proper removal of sand and gravel from Missouri's streams. In the mid 1990s, the regulation of this activity was taken up by the Army Corps of Engineers who took over the entire process of permitting and inspecting these mining facilities. The Army Corps of Engineers lost their jurisdiction over this activity in late 1998 owing to a ruling by the U.S. District Court of Appeals. The court found that "de-minimus" or incidental fall back of sand and gravel into the stream from which it was being excavated did not constitute the placement of fill by the mining operation. Hence, the court ruled that the Army Corps of Engineers had exceeded their authority in requiring a permit for this activity.

In January of 1999, the Land Reclamation Program resumed the former position of the regulatory authority over this type of mining activity and bases this authority upon the provision of the state's Land Reclamation Act. Approximately 150 permits were re-issued to the mining industry during the early months of 1999 by the Land Reclamation Program to take the place of the existing Army Corps of Engineer's permits. This responsibility continues to the present day on the part of the Land Reclamation Program involving 430 individual permitted sites.

Stabilization and revegetation of flood damaged stream banks consisting of acid-forming minespoil and coal waste improved water quality at the Upper Cedar Creek project in Boone County.





Wildlife and people benefit from effective reclamation and restoration of biologic communities.

On Sept. 15, 2001 the Land Reclamation Commission's published proposed rules in the Missouri Register that were intended to mirror the Water Pollution Control Program's gravel removal guidelines. During the period that followed, the Land Reclamation Program received many comments concerning these proposed rules. The Commission decided to hold four public meetings around the state in an effort to publicize the reason for the rules and explain the department's interpretation of them. These meetings were held in December 2001, followed by a public hearing on Jan. 24, 2002. After deliberation, the Commission decided to form a workgroup to review and possibly revise the proposed rules. The workgroup was to be made up of all interests from industry, landowners, anglers, hydrologists, environmental groups, government agencies, and others with an interest in streams and gravel mining. The workgroup's mandate was to come up with suggestions on what rules would be acceptable to all interested parties. The first meeting was on Sept. 9, 2002. Three subsequent meetings were on Oct. 22, 2002, Nov. 12, 2002 and Dec. 10, 2002. During the December meeting, the work group finalized recommendations for revised language of the proposed rules. These recommendations will be presented to the Land Reclamation Commission during the Jan. 30,

2003 meeting. After the Commission decides on the final wording, there will be a public comment period. Finalized rules are expected in 2003.

An individual does not need to obtain a surface mining permit to mine industrial minerals that will be exclusively for personal use.

Industrial Mineral Bond Forfeiture

The Land Reclamation Act, which went into effect Jan. 1, 1972, initially permitted and regulated the mining of limestone, clay, barite, tar sands, sand and gravel in Missouri. As part of that regulation, the companies and individuals so engaged were obligated to put up a reclamation performance bond in the amount of \$500 per acre for every permitted acre. Should the individual or company fail to perform the required reclamation, the bonds were then forfeited and the state was to complete the reclamation.

The bonding amount was subsequently found to be inadequate to cover reclamation costs as well as other inadequacies in the Act; therefore, the Act was amended effective Aug. 28, 1990. The amendment added additional minerals to those already regulated and increased the reclamation bonding to a minimum bond of \$8,000 for up to eight acres and \$500 for every acre permitted thereafter.

Between 1972 and 1990, 26 sites operated by 14 different companies became bond forfeiture sites and the responsibility of the department's Land Reclamation Program to properly reclaim. In 1999, one sand and gravel mine in Jefferson County walked away from their operation and forfeited the reclamation bond for the site. This site is approximately 6 acres in size and will be reclaimed to a water impoundment and wildlife area by the Land Reclamation Program. In 2000, a one-acre sand and gravel operator in Franklin County was unable to satisfy reclamation requirements and had her \$8,000 bond revoked. Recently, on May 30, 2002, the Land Reclamation Commission forfeited \$18,500 from an operator who was unable to satisfy reclamation requirements at a 29-acre limestone site in Randolph County that will be reclaimed to wildlife and water.

Metallic Mineral Activities

Metallic Minerals Permitting

In 1991, the department issued 11 permits to operators under the Metallic Minerals Waste Management Act. During 2001 and 2002, the Land Reclamation Program continued the five year review of the metallic minerals waste management permits. In 2002, the only underground iron ore producer, the Pea Ridge Iron Ore Company transferred their 180-acre permit area to an entity by the name of Upland Wings, Incorporated.

Metallic Minerals Waste Management permit applications consist of financial assurance information and detailed waste management area closure and inspection-maintenance plans. The plans establish and explain the technical steps proposed to accomplish and maintain closure after mining and waste disposal is completed. Issues addressed in the plans include the following:

1. the design and construction of waste control structures and tailings dams;
2. the characterization of waste products;
3. the methods for control and protection of surface water;
4. the methods for protection of groundwater and aquifers;
5. the geology and seismicity of the area;
6. the potential of subsidence;
7. the reuse and off-site removal of wastes; and
8. the surface reclamation of waste management areas.

During the on-going permit application review, Land Reclamation Program is coordinating with the other Department of Natural Resources Programs involved with the metallic minerals waste management areas. These agencies include the Air and Land Protection Division's Air Pollution Control Program, Solid Waste Management Program and Hazardous Waste Program, the Water Protection and Soil Conservation Division's Water Pollution Control Program and Public Drinking Water Program, and the Geological Survey and Resource Assessment Division. The coordination process will allow the other programs to review and comment on the technical aspects of the plans so that all department issues may be incorporated into the permit.

Metallic Minerals Inspection

Typically, inspections are performed semi-annually on the 11 metallic minerals waste management permit areas within Missouri. During the course of these inspections, all aspects of each company's permits are evaluated. The main focus of these inspections is to assess the company's compliance with virtually every environmental law that is administered by the Department of Natural Resources. The Land Reclamation Program is entrusted as the coordinating agency within the department for each active metallic mineral producer currently operating in Missouri. It is the program's responsibility to act as the liaison for the other programs within the department and each metal producer to ensure continuing compliance with all applicable state environmental laws.

Actual on-the-ground reclamation does not begin at these sites until mineral production is stopped and mine closure begins. Only one lead producer in Missouri is in active closure at the present time. Teck-Cominco American's Magmont Mine ceased production in 1995 and

A metallic mineral lead site, Teck-Cominco, after reclamation was completed in 2001.



began the actual reclamation of the surface effects of almost 30 years of lead mining and processing. During 2001 and 2002, three more facilities ceased production. The Pea Ridge Iron Ore Company's Pea Ridge mine ceased active mining operations and transferred their metallic minerals permit to a non-mining company named Upland Wings, Inc. The Doe Run Company's Viburnum mine and Buick smelter also ceased production. The Doe Run Company's Glover smelter is in the process of receiving approval from the department for a partial closure of an old slag pile at their facility. The closure and inspection-maintenance plans for these mines and smelters are either being reviewed by the department at this time or the department is waiting for submittal of revised closure plans for review and approval.

The Land Reclamation Program has been involved with the department wide inspection and surveillance activities being performed at The Doe Run Company's Herculanum smelter. In May 2001, the department, Environmental Protection Agency and The Doe Run Company signed a voluntary Administrative Order on Consent, which requires the company to conduct certain response actions to abate an imminent and substantial endangerment to the public health, welfare and environment.

Metallic Minerals Enforcement

To date, four enforcement actions under the provisions of the Metallic Minerals Waste Management Act have been necessary by the Land Reclamation Program. Enforcement actions at two smelters and two mines were initiated during this reporting period. These actions included violations for construction of a waste management control structure prior to department approval, the failure of two facilities to contain metallic mineral wastes within their approved waste management areas and the failure of a now bankrupt facility to submit annual permit fees.

Enforcement under this law is significantly different from enforcement under either the coal or industrial minerals units of the program. When it becomes necessary to issue a citation to any of the metal producers, the authority to do so rests solely with the director of the Department of Natural Resources. Enforcement is only authorized by law after attempts to eliminate the violation through conference, conciliation and persuasion have been exercised and exhausted. In early 2000, the department filed a request with the Attorney General's office to initiate a suit against a company for failing to provide the department with adequate financial assurance for each of their nine permitted areas. This suit is currently under review by the department and Attorney General's legal staff.

Abandoned Mine Land Activities

Since the early 1840s, coal mining has at times been a major industry in the north central and southwest portions of Missouri. Up to 6 million tons of coal were mined annually in the first three decades of the 20th century. Because mining companies gave little or no thought to the post-mining value of the land, some 67,000 acres of land were left abandoned prior to passage of Missouri's first strip-mine legislation in 1971. Although nature has adequately reclaimed much of this land over the years, more than 10,000 acres have been identified that require reclamation work to correct a wide range of public health, safety and environmental problems. These problems include safety hazards such as steep and unstable highwalls and embankments, open mine shafts, abandoned mining equipment and facilities, dangerous impoundments and unsanitary trash dumps. Acid mine drainage and sedimentation from exposed coal waste and mine spoils also pollute and clog streams. Subsidence, caused when old underground mines collapse, may damage overlying buildings.

Abandoned mine land reclamation took a giant step forward when the U.S. Congress enacted Public Law 95-87, the Surface Mining Control and Reclamation Act of 1977. The Act outlined specific requirements for the reclamation of lands mined after May 2, 1977 and established programs and funding for reclaiming abandoned mine lands. In January 1982, Missouri received approval from the federal Office of Surface Mining to operate the Abandoned Mine Land program and conduct reclamation work in the state.

Abandoned Mine Land Reclamation Funding

The Abandoned Mine Land activities of Land Reclamation Program are funded by the U.S. Department of Interior's Office of Surface Mining

Reclamation and Enforcement Abandoned Mine Land reclamation fund. All of the money in the fund is collected from active coal mining companies through fees charged on the tonnage of coal mined since passage of Surface Mining Control and Reclamation Act. The Office of Surface Mining Reclamation and Enforcement distributes the fund to the eligible states and American Indian tribes. To date, Missouri has received \$67.3 million in Abandoned Mine Land grants and cooperative agreements from the fund to conduct reclamation work in Missouri. However, because of steadily declining coal production since the late 1980s, Missouri and other Mid-western states have received decreasing allocations. In 1987, the U.S. Congress established an annual minimum base funding level in the amount of \$2.0 million to allow states with

AML Funding Summary (through 6/30/00)

Total Administrative Grants	\$7,225,736
Total Construction Grants	\$30,357,251
Total Consolidated AML Grants.....	\$19,793,880
Total Future Set-Aside Grants.....	\$35,394
Total Cooperative Agreements	\$8,145,861
Fiscal Year 1983 Rural Abandoned Mine Program (RAMP) Grant	\$812,371
Subtotal for Missouri AML	\$66,370,493
State and Federal Projects	
Federal Emergency Projects.....	\$16,800
Federal Contracts	\$28,314
RAMP Projects by Soil Conservation Service	\$926,543
Subtotal for Other Federal Projects	\$971,657
Total AML Activities	\$67,342,150

Table 6

significant abandoned coal mine problems but limited coal production to continue their Abandoned Mine Land programs. However, the \$2.0 million minimum base amount has consistently been reduced to \$1.5 million in the federal appropriations process. Missouri has an excellent record for obligating the funds received. Through state fiscal year 2002, 99 percent of all grants received have been contractually obligated for the completion of reclamation projects.

Abandoned Mine Land Inventory and Ranking

Public Law 95-87 requires that the highest priority abandoned coal mine sites be reclaimed before problems created by mining other commodities are addressed. The information pertaining to Missouri's abandoned coal mine lands is contained in the Abandoned Mine Land Inventory. This database currently contains 233 coal mine problem sites and six non-coal problem sites. It is continually updated as existing site conditions change or new sites are identified. The order in which abandoned mine land is reclaimed is initially determined by classifying the problem sites into three broad priority categories. Priority I and II problem sites are reclaimed first since they pose a threat to the public health and safety. Priority III problem sites adversely affect the environment and may be addressed after all priority I and II sites are reclaimed. On an annual basis, the unfunded Priority I and II problem sites are ranked and selected for future reclamation work according to the severity of

existing problems. To date, an estimated \$83.8 million in Priority I and II and \$73.9 million in Priority III Abandoned Mine Land problems have been inventoried in Missouri. Of these totals, \$41.1 million in Priority I and II and \$70.0 million in Priority III Abandoned Mine Land problems remain unfunded.

Abandoned Mine Land Reclamation Accomplishments

Land Reclamation Program has made much progress toward reclaiming Missouri's most severe abandoned coal mine problems. Ninety-three reclamation projects, totaling 3,916 acres have been completed since 1980. Engineering designs are being prepared for 6 additional reclamation projects covering 298 acres. These formerly barren and acidic wastelands are being

Abandoned Mine Land Reclamation Accomplishments Through 6/30/01

AML Problems	Reclaimed	Under Const. or Design	Total
AML Projects (#).....	93	6	99
Mine Openings (#)	168	14	182
Highwall (ft.)	85,169	19,090	104,259
Hazardous Facilities (#)	32	1	33
Subsidence (ac.)	3.6	0	3.6
Surface Burning (ac.)	19	0	19
Underground Mine Fire (ac.)	7	0	7
Unsanitary Trash Dumps (ac.)	74.9	1.1	76
Dangerous Piles/Embankments (ac.) ..	560.9	67.9	628.8
Clogged Streams (mi.)	10.8	0.0	10.8
Clogged Stream Lands (ac.)	1597.8	0	1597.8
Polluted Water: Human Consumption,			
Agricultural or Industrial (#)	49	1	50
Hazardous Impoundments (#)	17	0	17
Polluted Impoundments (ac.)	95.9	0	95.9
Spoil (ac.)	1,346.3	226.2	1572.5
Gob (ac.)	142.4	2.5	144.9
Slurry (ac.)	69	4	69.4
Total AML Acreage	3,916.8	298.1	4,214.9

Table 7

AML Reclamation Accomplishments

7/1/98 through 6/30/00

Final Design Completions:

Project Name	County	Acres	AML Problems *
5700 Rosa Ave. Subsidence	St. Louis, City	1	Exploratory Drilling, 1 home
Ellis Coal	Vernon	105	CSL, DH, DI, PI, EF, DP
Godfrey Drift	Cedar	5	3 VOs, 2 Ps, SP
Greasy Mine Non-Coal Shaft Closure	St. Francois	1	1 VO
Joplin Non-Coal Shafts Demo	Jasper	1	5 VOs
Joplin Non-Coal Shafts I	Jasper	1	12 VOs
Noah	Henry	32	DH, DP
Osage Township Subsidence	Bates	1	Drilling/Grouting, 1 county road
Perry Mine Fire	Monroe	5	UMF
Upper Cedar Creek Wetlands 2002	Boone	2	PWAI
		Total Acres	152

Construction Contract Awards:

Project Name	County	Acres	AML Problems *
5700 Rosa Ave. Subsidence	St. Louis, City	1	Exploratory Drilling, 1 home
Ellis Coal	Vernon	105	CSL, DH, DI, PI, EF, DP
Godfrey Drift	Cedar	5	3 VOs, 2 Ps, SP
Greasy Mine Non-Coal Shaft Closure	St. Francois	1	1 VO
Joplin Non-Coal Shafts Demo	Jasper	1	5 VOs
Joplin Non-Coal Shafts I	Jasper	1	12 VOs
Noah	Henry	32	DH, DP
Old Bevier Wetland Remediation	Randolph	—	CSL, PWAI, SA
Osage Township Subsidence	Bates	1	Drilling/Grouting, 1 county road
Perry Mine Fire	Monroe	5	UMF
Turner Shafts	Barton	1	6 VOs
Upper Cedar Creek CSI/319	Boone/Callaway	—	PWAI
		Total Acres	153

Construction Contract Completions:

Project Name	County	Acres	AML Problems *
5700 Rosa Ave. Subsidence	St. Louis, City	1	Exploratory Drilling, 1 home
Ellis Coal	Vernon	105	CSL, DH, DI, PI, EF, DP
Godfrey Drift	Cedar	5	3 VOs, 2 Ps, SP
Greasy Mine Non-Coal Shaft Closure	St. Francois	1	1 VO
Joplin Non-Coal Shafts Demo	Jasper	1	5 VOs
North Weyer Shafts	Macon	2	4 VOs, WA
Old Bevier Wetland Remediation	Randolph	—	PWAI, SA
Osage Township Subsidence	Bates	1	Drilling/Grouting, 1 county road
Perry Mine Fire	Monroe	5	UMF
Turner Shafts	Barton	1	6 VOs
Upper Cedar Creek CSI/319	Boone/Callaway	—	PWAI
		Total Acres	122

*Key to AML problem abbreviations:

CSL - clogged stream lands
DH - dangerous highwall
DI - dangerous impoundment
DP - industrial or residential waste dump
EF - equipment & facilities
P - portal

PI - pit
PWAI - polluted water agricultural/industrial
SA - spoil area
UMF - underground mine fire
VO - vertical opening
WA - water problems (acid mine drainage & sedimentation)

Table 8

are being reclaimed to productive uses such as recreation, pasture, forage and wildlife habitat. Acid mine drainage is being mitigated returning streams and lakes to productive uses and restoring aquatic biota. A total of 168 dangerous mine openings have been closed, protecting Missouri citizens and property. Tables 7 and 8 provide details as to the types and numbers of problems reclaimed. Despite these notable accomplishments, an additional 6,000 acres remain to be reclaimed as grant funding becomes available.

Missouri's Abandoned Mine Land Emergency Program

In March 1998, the Land Reclamation Program submitted a proposed amendment to its state Abandoned Mine Land reclamation plan that allowed Missouri to assume the administration of the coal Abandoned Mine Land emergency program on behalf of Office of Surface Mining. The amendment was approved by Office of Surface Mining, and the administrative procedures and guidelines for conducting the emergency program were completed in late 1998. The program has been responsible for investigating all emergency complaints in Missouri and conducting reclamation work when emergencies are declared since Fiscal Year 1999.

An Abandoned Mine Land emergency is a sudden event related to past coal mining that has a high probability of causing substantial harm. There also must be a need to abate the emergency more quickly than would be possible under normal Abandoned Mine Land program operations. Sometimes an emergency complaint constitutes an eligible coal mine problem, but the situation does not meet the emergency criteria. In this case, reclamation work could still be undertaken by the Land Reclamation Program under the normal Abandoned Mine Land coal program. The proposed reclamation project, however, would be subject to the project ranking and selection process and would have to compete for available grant funds along with other priority I and II problem sites.

During Fiscal Year 2001 and 2002 the Land Reclamation Program conducted 6 emergency

investigations. Most of these emergency investigations related to possible mine subsidence in the City of St. Louis, but investigations were also conducted in Rich Hill, MO and a public road in the Osage Township of Bates County. Emergency subsidence investigations consist of a staff evaluation of the suspected area with regard to past coal mining and known geological conditions. If these evaluations indicated that mine subsidence was possible, exploratory drilling was conducted. Several drill holes would be drilled in or near the suspected area. These drill holes would inform Land Reclamation Program of the depth and extent of mining and would provide information of the stability of the rock and soil layers above the mining. In these investigations, Land Reclamation Program determined that past underground coal mining was not the cause of the settling that was occurring in all investigations except Bates County. The causes of the settling in the City of St. Louis are most likely due to poor storm water drainage or shrinking of clay material below the structure foundation. If it was determined that collapsing coal mining voids were present like in Bates County, a contractor was mobilized to fill the voids with grout. Grout is a mixture of cement, sand and flyash. The mixture was pumped into the mining void to provide stability so any future subsidence will be greatly reduced.

Perry Mine Fire Emergency Reclamation Project

On November 10, 2000 the Abandoned Mine Land Unit was notified of a possible emergency concerning a fire burning five acres of abandoned coal mine spoils in Monroe County, 3 miles west of Perry. The fire was spreading underground. Toppled trees and smoke were the only clues to the burning. Abandoned Mine Land staff investigated the site later that day and confirmed that the coal spoils were burning and expelling smoke and noxious fumes. The smoke was affecting a homeowner whose house was 100 yards from the site. Such fires have a strong hydrogen sulfide odor and high levels of carbon monoxide. The fire was declared an Abandoned Mine Land emergency due to the noxious fumes and the threat of a spreading wildfire with numerous homes and structures in the vicinity.

Abandoned Mine Land staff investigated the site on November 14, 2000 and determined the depth, extent and source of the fire. The burning material was carbonaceous black shale that lay above the coal seam. On November 17, 2000, a contract to extinguish the fire and re-grade the disturbed area was awarded to the low bidder in the amount of \$8,700. Work began on November 20, 2000. Since the fire was burning below the surface, the contractor excavated the burning material so it could be scattered on the surface and extinguished. The fire was extinguished after 10 days of work. The remaining earthwork was delayed until the spring of 2001 due to snow and bad weather. Since the subsurface burning was more extensive than originally anticipated, the contract was amended to provide for more hours of excavation equipment operation. The Abandoned Mine Land staff periodically monitored the site during the winter months to ensure that the fire was completely extinguished. The remaining earthwork and final seeding were completed during April of 2001. The final contract amount was \$24,165.

Abandoned Mine Land Feature Projects

Ellis Coal Reclamation Project

The Ellis Coal project site is located in Vernon County approximately 1 mile northwest of the town of Bronaugh. Coal was mined from 1950 through 1959. In the summer of 2001, the Land Reclamation Program awarded a contract to reclaim the site. The project site consisted of 95 acres of sparsely vegetated, barren, dangerous piles and embankments. Plans included grading of spoils to natural contours and the removal of a residential waste dump. In addition, a 25-foot high, 1,400-foot long dangerous highwall was graded. The project was completed in October of 2001 at a total cost of \$509,461.

Greasy Mine Shaft Reclamation Project

The Greasy Mine Shaft is located in southern St. Francois County near Farmington and six miles from the town of Doe Run. It was an abandoned hematite mine that mined the commodity specular hematite around 1912. It was one of the first non-coal shafts in Missouri to be



closed with Abandoned Mine Land funds. Once approval was obtained from the Land Reclamation Commission and the Office of Surface Mining, the Abandoned Mine Land Unit took action to close this high priority, non-coal shaft that posed a safety threat to landowners and the public.

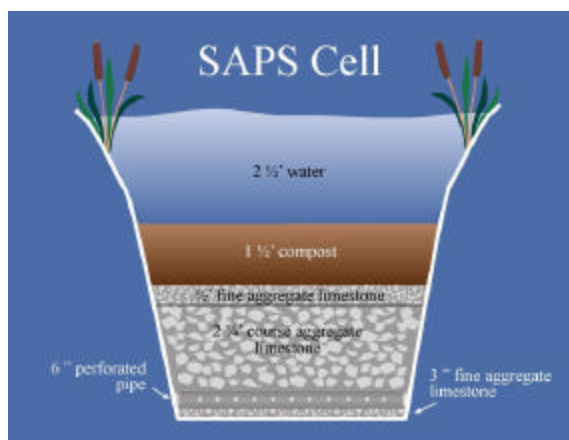
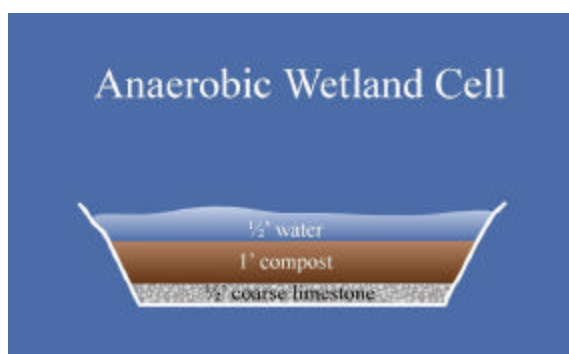
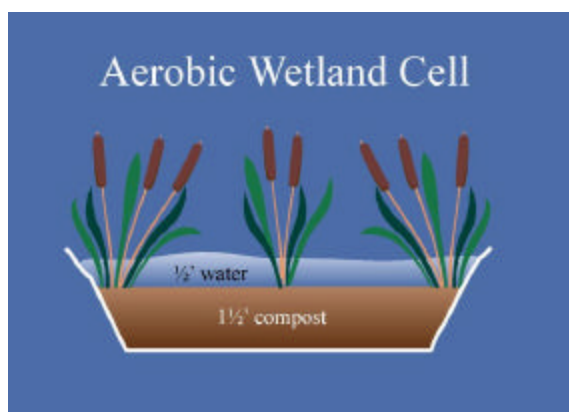
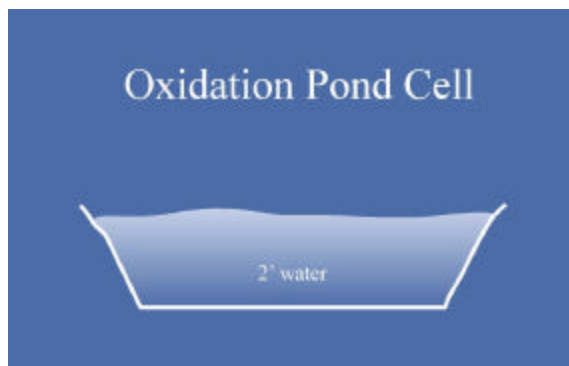
Land Reclamation Program awarded a contract to close the Greasy Mine Shaft in November 2001. Dimensions of the 100-foot deep shaft are approximately 6 feet by x 8 feet, enclosed on all four sides by intact 12-inch thick concrete walls. The shaft was sealed with a 12-inch thick concrete cap including rebar support. The 2-piece cap was poured and cured off-site in December 2001 and placed over the shaft opening on February 14, 2001. Because of the potential for development in the area, an aluminum marker was placed flush with the concrete indicating date of closure, an ID number, and instructions to call the Department of Natural Resources for more information. The final construction cost was \$2,999.

Old Bevier Wetland Remediation Project

The Old Bevier Aerobic Wetland in Macon County, Missouri, was constructed between 1990 and 1991 by the Land Reclamation Program for the purpose of treating acid mine drainage (AMD). Acid mine drainage is drainage flowing from or caused by surface mining, deep mining or coal refuse piles that is typically highly acidic with elevated levels of dissolved metals. The

Burning coal waste at Perry Mine causes serious respiratory problems, destroys property, and poses a threat of severe burns to unsuspecting people because of the lack of flames.

Old Bevier's passive treatment wetland consisted of cells with varying depths of water, limestone, and organic matter.



principle source of the AMD is from an underground mine that operated during the 1920's through 1950's, much of which was later surface mined in the 1950's. When a critical dilution water supply became unavailable, the total acidity of the AMD overwhelmed treatment capacity of the aerobic wetland. The wetland could no longer neutralize the AMD, and aquatic vegetation deteriorated and treatment became ineffective. The Land Reclamation Program with the assistance of the U.S. Office of Surface Mining, Mid-Continent Regional Coordinating Center rehabilitated the Old Bevier Aerobic Wetland in 2001, incorporating newer technologies to improve the performance.

Construction included an extension of the AMD collection pipeline, a 2-stage Vertical Flow Wetland System and associated oxidation cells and aerobic wetlands. The improved system is designed to treat AMD discharge with high iron and acidity, but low aluminum content. Evaluations of the wetland after completion show a marked decrease in iron and an improvement in the net alkalinity. Water emptying into the tributary of the Chariton River is at a near neutral pH. Although no specific structures were incorporated in the design for manganese removal, the level of manganese in the discharge is significantly lower than the inlet to the wetland.

Upper Cedar Creek Clean Streams/319 Project

The Upper Cedar Creek (UCC) area is a long-term watershed project of the Land Reclamation Program. Cedar Creek forms the border between Boone and Callaway counties in central Missouri, and formally was one of the worst Abandoned Mine Land environmental problems in the Midwest. Periodic discharges of AMD and acidic sediments severely degraded water quality in Cedar Creek and resulted in numerous fishkills from 1948 until 1980. On several occasions, the entire 44 miles of stream was made lifeless. Only the flow of the Missouri River diluted the pollution impact. The entire creek bottom was mined through, accentuating water quality problems. Cedar Creek is listed on the state's 303d list for impaired waters of the state that do not meet water quality standards of the Clean Water Act by exceeding the minimum standards for pH and sulfate.

In the 1980s, Land Reclamation Program completed three projects, reclaiming 706 acres in the Upper Cedar Creek watershed. Total cost was \$4.7 million. The final of the three was the 404-acre Upper Cedar Creek project, completed in 1990 at a cost of \$2.3 million. Reclamation improved water quality in Cedar Creek and reduced the likelihood of mine-related fishkills.

Missouri Abandoned Mine Land was awarded \$204,094 from the Office of Surface Mining Clean Streams Initiative and \$150,000 of EPA funds through a 319 grant. The Clean Streams/319 project worked with local environmental groups and state and federal agencies. The main emphasis of the project was to improve Cedar Creek water quality. The Upper Cedar Creek area minelands are extremely acid forming with high concentrations of pyrite. Flooding in the 1990s caused significant damage to the streambanks at UCC and released additional acid-forming sediments into Cedar Creek. Much of the completed work repaired this damage and will limit future flooding impacts.

Construction completed in 2001 and 2002 included repair of streambanks to mitigate flood damage and planting of native trees and shrubs to restore riparian environmental quality. Six wetlands and alkaline producing cells were built to treat AMD and remove dissolved metals. Heavy agricultural lime applications were required to repair acidic hotspots that are eroding and causing sedimentation and stabilization problems. Wildlife habitat was improved with the planting of native grasses.

Non-Coal Reclamation

Under SMCRA, state and tribal Abandoned Mine Land programs must give priority to reclamation of abandoned coal mines. However, Section 409 of the Act provides that, at the request of the Governor of the state or the head of the tribal body, non-coal reclamation projects may be undertaken on a case-by-case basis before the priorities related to past coal mining have been fulfilled. Reclamation of such non-coal Abandoned Mine Land sites must be necessary for the protection of the public health, safety and general welfare from extreme danger, thereby meeting Priority I problem criteria. To date, the Land Reclamation Program has not



reclaimed any non-coal Abandoned Mine Land sites under Section 409 of the Act.

In fiscal year 2000 the Land Reclamation Program received approval from the Missouri Land Reclamation Commission to utilize Abandoned Mine Land Funds for closure of Priority I non-coal shafts. At this time Land Reclamation Program is obtaining an eligibility opinion from the Attorney General's Office regarding the use of Abandoned Mine Land funds to provide closure for 19 vertical openings. Once this is obtained Land Reclamation Program will work with the department's administration and the Governor's Office to obtain the formal request from the Governor. Land Reclamation Program expects to complete this task by late spring, 2001 so construction work on the closures can be initiated during the summer.

During fiscal years 1998 and 1999 the Land Reclamation Program was involved in a joint project with the department's Hazardous Waste Program to demonstrate reclamation techniques at abandoned lead/zinc sites in Jasper and Newton counties. The Hazardous Waste Program received grant funds from the U. S. Environmental Protection Agency to conduct the demonstration work and the Land Reclamation Program has utilized the funds to complete construction activities. The Land Reclamation Program and the Hazardous Waste Program staffs jointly completed the design work for the sites. The Land Reclamation Program, utilizing local contractors, completed the earthmoving

Wetlands improve water quality and wildlife habitat at the Upper Cedar Creek Project in Boone County.



A large steel wedge was filled with concrete to plug shafts in the Joplin area.

activities, soil amendments and seeding on approximately 55 acres of mine tailings. Additionally, ten dangerous mine shafts were filled or sealed as part of this demonstration work in Jasper and Newton counties.

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After discussions with the Office of Surface Mining in 1999, Office of Surface Mining determined the Land Reclamation Program could proceed with non-coal reclamation if the above criteria were met. The Land Reclamation Program received approval at the May 25, 2000 meeting of the Land Reclamation Commission to utilize Abandoned Mine Land funds for closure of priority I non-coal shafts. In FY 2001 the Attorney General's Office determined 19 dangerous shafts were eligible to receive Abandoned Mine Land funding. The process was completed on August 8, 2001 upon receipt of the Governor's letter to the Office of Surface Mining that re-

quested that Abandoned Mine Land funds be used to close 19 shafts and any additional openings that are discovered that require immediate attention. Reclamation work began in the fall of 2001.

Joplin Shafts Lead/Zinc Shaft Closure Demonstration & Phase I

Eighteen extremely dangerous lead/zinc mine openings have been identified in the Webb City and Center Creek problem areas located between Webb City and Oronogo. Land Reclamation Program contractors have closed 17 of these shafts by the summer of 2002.

Two of the openings were closed by permanently plugging the upper portion of the shafts with a thick layer of spray polyurethane foam. Land Reclamation Program contracted with a local roofing contractor, who performed the work during the first week of December 2001 at a total cost of \$7,200. This was done as a demonstration project to determine how well the polyurethane foam technology worked before applying this closure method to other shafts.

Three of the openings were closed by fabricating and installing protective steel grating over the existing concrete mine shafts collars. A local contractor performed the work during the first week of January 2002 at a total cost of \$2,000.

During the spring of 2002, designs were completed for sealing 9 additional mine shafts with steel-reinforced concrete plugs. An on-site pre-bid meeting was held on April 23, 2002. Construction bids were opened on May 9, 2002. The contract was awarded in the amount of \$89,000, and work began on July 8, 2002. A change order to the construction contract was subsequently negotiated to close three additional shafts. The work was inspected and accepted for final payment on August 13, 2002. The final construction cost for closing the 12 shafts was \$103,300.

Land Reclamation Program plans to close the one remaining shaft in the Webb City area along with eight additional shafts located in other areas of Jasper County during the fall of 2002.

Environmental Indicator

Reclaiming Mined Land

Health, safety and environmental problems associated with mining include acid mine drainage runoff, soil erosion, abandoned shafts and other unsafe conditions. The Missouri Department of Natural Resources is responsible for minimizing the environmental and health-related impact of mining activities. Of the 194,139 acres of Missouri land disturbed by mining activities, 68,839 acres have been reclaimed or will be reclaimed. Of the remaining 125,300 acres, 55,400 acres of abandoned coal mine lands will not be reclaimed because they are naturally stabilized and are not a threat to public health or the environment. The remaining 69,900 acres are metallic and industrial mineral sites that have no funding available for reclamation.

Missouri coal is now surface-mined. Sites that were mined before laws were in place to protect the land were generally left as they were, with acid-and toxic-forming materials exposed. Today, mining companies are required to backfill the overburden into the pits and bury the acid-and toxic-forming material and replace the topsoil. This restores the land to a productive use.

Industrial minerals are generally mined in a similar fashion. However, the amount of overburden is much less, and the mineral deposit is much thicker.

Metallic minerals are deep mined through elevator shafts constructed to the deposit. The ore is removed from the rock through a flotation process. The waste rock materials, called tailing, are sluiced to huge ponds or piles. Before environmental protection laws were in place, tailing piles were simply left when the ore deposit was depleted. The mines filled with water, and in some cases, had open shafts exposed. The tailings were left to wind and water erosion, which resulted in serious air and water pollution problems.

Today, all mining companies are required to provide financial assurance through reclamation bonds. These bonds ensure that sites are properly graded, revegetated and maintained after mining ceases.

Challenges to Missouri's Land

Another challenge is reclamation of lands disturbed by mining and abandoned by the mining operators before environmental protection laws were passed. Only abandoned coal mine lands are eligible for federal Abandoned Mine Land cleanup funding, and these funds are very limited. Some abandoned lead and zinc-mined lands may be eligible for cleanup under federal law. The other abandoned mine land sites, including lead, zinc, barite, limestone, clay, sand, gravel and some other commodities, will remain unreclaimed until funding is available.

Acreage of Land Reclamation Sites Permitted in 2001



* Does not include the in-stream sites that are permitted by the Corp of Engineers.

Land Reclamation Information

Missouri AML Technical Assistance Bulletins - Landowner Management Guide for Minelands

1. Strip Pit Management and Neutralization
2. Cool-Season Grass Stand Management on Reclaimed Minelands
3. Warm-Season, Native Grasses on Reclaimed Minelands
4. Establishing and Managing Warm Season, Native Grasses on Reclaimed Minelands
5. Tree Planting on Missouri Minelands
6. Tree Species for Missouri Minelands

Also available:

Missouri Department of Natural Resources
Abandoned Mineland informational flyer.

For further assistance or to obtain copies of these publications please contact the Missouri Department of Natural Resources' Abandoned Mine Land Section at P.O. Box 176, Jefferson City, MO 65102-0176 or call 1-800-361-4827 or (573) 751-4041.

Information on the Internet

Missouri Department of Natural Resources

Department Main Home Page
(www.dnr.mo.gov)

Land Reclamation Program
(www.dnr.mo.gov/alpd/lrp)

Environmental Assistance Office
(www.dnr.mo.gov/oac/eao)

The Complete Missouri Mining Law
(www.moga.state.mo.us/statutes/c444.htm)

U.S. Department of Interior Office of Surface Mining

Office of Surface Mining (OSM)(Washington D.C.)
(www.osmre.gov/osm.htm)

OSM - Mid-Continent Regional Coordinating Center (Alton, IL) - (www.mcrcc.osmre.gov)

Other Mining and Reclamation Organizations

National Association of Abandoned Mine Land Programs
(www.onenet.net/~naamlp/)

Interstate Mining Compact Commission
(www.imcc.isa.us)

National Association of State Land Reclamationists
(www.siu.edu/~coalctr/naslr.htm)



Missouri Department of Natural Resources Land Reclamation Program

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